Learn to Move: a competition to bridge biomechanics, neuroscience, robotics, and machine learning to model human motor control

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Summary

We are hosting "Learn to Move: Walk Around" competition in the NeurIPS conference to invite machine learning experts to develop controllers that generate versatile human-like locomotion. It is a follow-up to our NeurIPS 2017 "Learning to Run" and 2018 "AI for Prosthetics" challenges, which attracted together 993 participants and 6729 submissions [1,2] (Figure). This year's task is to develop a controller for a 3D human neuromechanical model (in OpenSim) to walk or run following velocity commands with minimum effort. In the long-term, we aim to bridge researchers in machine learning, robotics, biomechanics, and neuroscience to tackle a grand challenge of understanding and modeling human motor control [3-5]. In Dynamic Walking 2019, I would like to introduce the current challenge, review some of the successful approaches in the past challenges, and discuss potential how to design future competitions to pursue the interdisciplinary long-term goal.

Related Links

- Past challenges:
  - https://www.crowdai.org/challenges/nips-2017-learning-to-run
  - https://www.crowdai.org/challenges/neurips-2018-ai-for-prosthetics-challenge
- Source codes: https://github.com/stanfordnmbl/osim-rl
- Project page: http://osim-rl.stanford.edu/

References

[1] Kidziński, Ł et al., (2018). Learning to run challenge solutions: Adapting reinforcement learning methods for neuromusculoskeletal environments. *The NIPS'17 Competition: Building Intelligent Systems*.

[2] Kidziński, Ł et al., (2019). Artificial intelligence for prosthetics-challenge solutions. *arXiv preprint*.

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[4] Song, S., & Geyer, H. (2015). A neural circuitry that emphasizes spinal feedback generates diverse behaviours of human locomotion. *The Journal of physiology*.

[5] Peng, X. B., Berseth, G., Yin, K., & Van De Panne, M. (2017). Deeploco: Dynamic locomotion skills using hierarchical deep reinforcement learning. *ACM Transactions on Graphics (TOG)*.

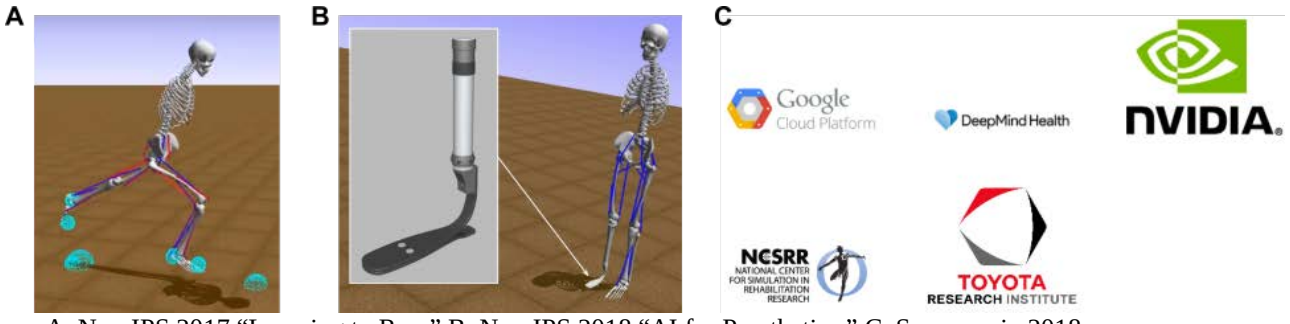

Figure. A. NeurIPS 2017 "Learning to Run." B. NeurIPS 2018 "AI for Prosthetics." C. Sponsors in 2018.